Top, left—The schools are just beginning to recognize a child's ability to draw, paint and color. If there is real ability it should not be lost in the shuffle of reading, writing and 'rithmetic later on. Top, right—Many a husky lad loves the farm, and many another would find real enjoyment and prosperity there if his teacher could teach him the principles of farm management that would assure his success in the world's oldest industry. These lads are having the time of their lives playing nursemaid to this young porker. Center, left—There is something a little bit more human to a lad who has tried to work a saw and a plane and has succeeded in cutting a board straight, than to the Percies who can read Dante in the original. Center, right—This little girl shows a real love for molding in clay. Without any training she delights her parents and older people with her ability to catch the expressions and attitudes of the people she sees. Our present system of schools will soon eliminate this natural ability, for there is no place for its expression. She will become another machine-made educational product. Bottom, left—Even girls like to tinker. There are now places open in the industrial world for female mechanics. The specialized world in which we live offers a place for skilled workers of both sexes. Bottom, right—Johnny likes to make things. There is real fun in learning how to use the saw and hammer and nails. Vocational schools take this liking and make valuable craftsmen from it.

How the Human Body Fights Germs

By G. H. HEALD, M. D.

FOR the ordinary observer—which means about all of us—it is hard to realize that around the body and within the body there is being waged a relentless and endless guerilla warfare. It is a warfare between the body tissues and certain organisms which live a parasitic existence—that is, they live at the expense of the being which they infest. These parasitic marauders vary in size from worms several inches in length to minute organisms much smaller than the point of the finest needle. Some of these minute organisms are animal, some are vegetable. Naturally, these organisms must find in the body conditions favorable to their growth and multiplication, else they would not survive. They find moisture, food, and a proper temperature, so that if they gain an entrance into the body, or into the tubes lined with mucous membrance (the air and food passages, and so on), they may multiply and cause trouble.

The greater number of infections takes place because the germs gain an entrance into some of the passages of the body, particularly the food and air passages, where they find ideal conditions for rapid multiplication.

How They Enter System

With food and drink, and on eating and drinking utensils, and on the other articles which are sometimes put into the mouth—fingers, coins, pipe stems, cigar holders, and a host of others—germs are taken into the mouth; many of them harmless, some perhaps dangerous. And with every breath particles of dust and germs are inhaled, some of which are not harmless. It is true that we have certain more or less efficient defenses against these intruders; the hydrochloric acid in the stomach and the little epithelial cells in the air passages which are arranged as brooms to sweep out germs and other foreign bodies. Moreover, the healthy secretions of the nose are more or less antagonistic to germ growth.

The tonsils in health, and the little lymphatic "glands" or nodes in the neck seem to have the function of destroying many germs that are brought to them. They act as sentinels to the body. When, for any reason, the tonsils and lymph glands are diseased, they no longer form an adequate protection against the inroads of germs.

Not only may the tonsils cease to act as sentinels, but they may actually become badly infected themselves and form a center from which the germs are spread to set up infection elsewhere. Thus after an attack of tonsillitis one may have an attack of articular rheumatism, one joint being affected after another—for the germs are floating around in the blood current—and likely as not they will attack and damage the valves of the heart. In children an attack of tonsillitis may also be followed by an attack of chorea, or "St. Vitus' Dance," another rheumatic disorder. Thus the tonsils, which should be sentinels to protect the body, have in these instances surrendered to the enemy and have been used by the enemy as a sort of headquarters from which to carry on the warfare against the body.

The body has many defenses, in addition to those at the surface—many means of protecting itself against its environment. Were it not so, it would not long survive. When one recovers from any infectious disease it is not because he was cured by some medicine, but because the body defenses have thrown off the invaders.

Right Living a Good Weapon

Most interesting among the body defenses are the white blood cells, which under certain circumstances swallow the germs and digest them. These white cells are efficient or inefficient, according to the general tone of the body.

One who, by the observance of hygienic measures, keeps his bodily condition at par, is much more likely to overcome an invasion of germs than one who, by careless living, or through ignorance, has allowed his physical condition to drop below par.

Besides the white cells there are other body defenses. There is some germicidal principle in the serum, or liquid part of the blood. Moreover the body, when threatened with a germ invasion, may react by forming specific antibodies, designed to antagonize the particular germs, or their poisons, for which the antibody is formed.

In view of the fact that the body is often too slow in forming these antibodies, we sometimes increase artificially the body defenses. For instance, a horse is given minute doses of diphtheria poison, sets up a reaction and develops some antibodies. Then it is given a larger dose and a larger, at intervals of a few days thus increasing the dosage for months, until its blood is rich in diphtheria antibodies or antitoxin. Some of the blood is drawn off, clotted, and the liquid part put up in sealed sterile packages and used as a preventive or treatment of diphtheria. A small injection of the horse serum into the body of the child wards off or cures an attack of diphtheria. In like manner, serum is prepared to antagonize the tetanus or lockjaw poison.

Again, instead of manufacturing the antibodies in the body of a horse, we make the person manufacture his own antibodies. To render a person immune to typhoid fever, for instance, increasing doses of killed typhoid germs are injected into his body, for three times. The body in defense creates typhoid antibodies; and should the person by accident get contaminated water or food, he is comparatively immune to typhoid infection.